Module 6

Determining Significant Aspects: Prioritizing Concerns and Setting Objectives

From your work in Module 5, you have probably identified a number of "environmental aspects" associated with your company's activities. This Module will help you prioritize those aspects. It will also help you determine which one(s) you will want to work on first. Do not expect to work on all the environmental aspects identified. "Continuous improvement" implies that this is an on-going process where you address some concerns now and others in the future.

DfE Program
Projects emphasize integrating risk and conservation of resources evaluation into performance and cost evaluations.

Your operations may have many environmental aspects, but they may not all be significant. By scoring each aspect against a set of environmental criteria (e.g., toxicity, wasted materials), you can determine which are most significant. Selecting significant environmental aspects (SEAs) to work on involves practical considerations as well as some idea of expected improvements (benefits) from the project. Scoring against a set of practical criteria (e.g., technical and economic feasibility) and listing benefits criteria (e.g., improved health), will help you decide which aspects to address first. For those you select, you will set objectives in terms of the improvements you hope to make.

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It is important to prioritize aspects carefully. Two considerations are: if you intend to seek ISO certification for your EMS, it will be necessary to address **every** aspect you select as significant. Secondly, you may wish to include some short term, relatively easy projects to get started on your EMS. Therefore, include resources, time frame and ease of carrying out as criteria in your prioritization scheme.

Determining what aspects are significant includes making subjective decisions. For this reason, results will be improved by having a team of people representing different job categories who can provide a cross-section of operational experience when you work on this Module.

Step 1: Determine Your Selection Criteria

First, make a list of criteria against which you will judge or score the environmental aspects. It will be helpful to review Module 3, where you gained an understanding of your company's values regarding the environment. Concerns of companies that have gone through this process include:

Regulatory Concerns

Are regulatory concerns for this aspect being met in a consistent manner? How difficult is it to meet compliance obligations?

Pollution

How much unintended output or byproduct is there from this aspect? In other words, how much waste output is there? What are the sources of pollution to air, water, land? Does the pollution output occur inside the facility before being released outside, or is it all being released outside? Is there control technology for the pollution?

Risk

Effects of Chemicals: How serious are the environmental concerns with this aspect's chemicals or materials or to pollution from it?
Workers: How frequently and how severely will employees be **exposed** to this aspect or to pollution from it?
Community: How frequently and how severely will people in the surrounding community be **exposed** to this aspect or to pollution from it?
Environment: How frequently and how severely will the environment be **exposed** to this aspect or to pollution from it?

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Pick those criteria that are important to your company.

Safety, including noise: What safety/noise hazards may be generated by this aspect?

Natural Resource Use:

How much water, soil, energy, or other forms of resources, such as landfill space and fossil fuels, are being consumed during this aspect?

Global and Local Concerns: (not on chart)

Other criteria that some companies have used include global warming, water quality, ozone depletion, photochemical smog, acidification, habitat destruction, etc.

The explanation under each criterion is phrased as a relative question because the scores will be based on your judgment rather than on precise measurements. Also, there are potential overlaps between some of the categories, such as global concerns, risk and pollution. It is only important that you understand the categories that you select and know what you understand to be included in each. You may wish to use this list, add to it, break the categories into parts, or make it shorter. The important thing is to keep it simple and clear and to make sure it reflects your company's values.

Using your list of criteria, create a worksheet using Worksheets 6-2a and 6-2b, shown later in this module, as an example. These worksheets use the criteria identified above and the aspects from Module 5. There is also a blank worksheet in the Appendix Tool Kit. At this point, you may not wish to look at all business activities. You may wish to pick one and work through the rest of the modules with that information before examining the other areas. Make this process work for you according to your schedule and needs.

FLAG!

Remember: "aspect" refers to the potential for environmental impact. A significant aspect would have the potential for large impact. Even aspects that are well-controlled should be considered for their **potential** for impact should controls fail.

Step 2: Score Your Environmental Aspects

When scoring your aspects, you may wish to organize your criteria under the headings "Regulatory Concerns," "Risk," "Pollution," and "Natural Resource Use." Organizing the columns in this way helps to identify the category of concern for each aspect, and helps in determining which approaches are desirable in addressing the concern. Including regulatory concerns will help you identify those aspects that are of regulatory interest so that you can include management of these in your EMS. You may wish to work on these first if they are important to your company. The following provides a brief explanation of one way to evaluate the criteria in the worksheet.

The aspects are scored using symbols representing a range of high (H) to low (L). The following symbols are used and their meanings are interpreted for use in this exercise. It is important that you phrase the meaning consistently across all scoring categories. This is most straightforward if you think of "high" as meaning ultimately a project you would like to undertake and "low" as one having lesser priority. Thus, when considering environment effects, a chemical receiving a "low" score would be one with low impact or good environmental performance.

Figure 7: Scoring Symbols

Symbol	Meaning	DfE/EMS Meaning
H	High	Most environmental impact
M-H	Moderately High	More environmental impact
M	Moderate	Less environmental impact
M-L	Moderately Low	Lower environmental impact
L	Low	Lowest environmental impact

Regulatory Concerns

For each aspect, identify whether or not it has regulations associated with it and how important these are to your company. For example, an aspect might be regulated but your company might be so small that it was exempted from the regulation. The regulatory concern for your company might therefore be considered low (not as important for a project). On the other hand, there might be an aspect that does have a regulation applying to your company. If you don't have a problem staying in compliance, you might rank the regulatory concern low. Or you may rank this high (meaning it may be a good candidate for a project) if the cost of compliance is large or you have experienced difficulties in meeting compliance. You do not need to consider in this column what kind of environmental concern this aspect is. That will show up as you rank the remaining columns for this aspect.

Pollution

Pollution is the byproduct of your company's operations. A byproduct may be created unintentionally or as a known output of operations. It can occur in the form of releases to the air, water, or soil during operations, or it can occur as the waste product left after your production or servicing cycle is completed. It can also occur in a consumer product that your company produces. For example, excess packaging around a product might be considered "pollution" because it can contribute to a landfill's solid waste burden. Conversely, a consumer product whose waste materials can be recycled might not be "pollution," but rather an example of successful "pollution prevention." Score aspects according to the degree of pollution created. In some cases, the pollution might result from inefficiencies in your process or "wasted materials." There may be some overlap between "pollution" and risk because some kinds of pollution may cause risk. Still, highlighting pollution with a score might

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Pollution Prevention may provide some "low-hanging fruit" in the form of quick and low-cost things that can be done to achieve environmental improvements. These may be accomplished in addition to larger projects. Some examples include turning off lights/equipment when not in use, recycling/reusing office paper, and keeping the lids on solvent containers. Further discussion and tracking form are provided in the Tool Kit.

provide some quick solutions when you identify aspects to work on. High pollution = H; Low pollution = L.

Risk

In brief, **risk assessment** is a process that integrates the work of several sciences to determine the kind and degree of environmental and human health impacts **potentially** produced by **exposure to** a chemical or material. Although you will not attempt a formal risk assessment for your DfE/EMS, this module will help you apply your working knowledge and judgment about the chemicals and materials your company uses, and the way in which they are used, to select environmental goals to help create healthier working conditions, communities, and environments.

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Visit the DfE website for more tools related to risk.

http://www.epa.gov/opptintr/dfe/index.html

Risk is composed of two parts: toxicity (hazard) and exposure. **Toxicity** is the ability to cause harm to the health of humans, wildlife, or vegetation, as well as the type and seriousness of that effect. The information needed to form a judgment about effects was collected in Module 5 in the "Environmental Concerns Worksheet." Review the chemical effects information for each aspect and give a score based on your judgment of the seriousness of the effects of this chemical or substance.

Exposure is the **amount** of material that workers, the community, or the environment come into **contact** with. The amount is determined by both the **severity** and the **frequency** of contact. Severity refers to the amount of material that one can come into contact with at any one time. Frequency refers to the number of times in a given period that contact might occur.

An important element in exposure is **contact**. If there is no possibility of contact occurring, then there may be no exposure and therefore no risk. In some cases, as when a toxic substance such as lead is embedded in a product such that no contact occurs during use of that product, the toxic substance may still leach out of that product if it is disposed of in a landfill. The possibility of contact throughout the use and disposal of a product should therefore be considered. If, however, a toxic substance is contained such that neither humans nor the environment would come into contact with it, then exposure would be low, and the rank given to the "Workers, " "Community," and "Ecology" would be "Low" (L). It is necessary, therefore, in ranking exposure, to consider how contact might occur and whether, in fact, it does.

Contact with humans and animal or plant life is characterized as occurring along **pathways**. These pathways describe the routes along which the substance must travel and how the substance is taken up by the living organism. Several pathways for human exposure include:

- breathing the material (inhalation pathway),
- touching the material (skin pathway), and
- ingesting the material (oral pathway).

Substances can come into contact with living organisms through air, water, soil, and other solids. For example, chemicals and substances can be inhaled from the air in the form of dust, vapors, and mists. Humans can ingest chemicals and substances in fluids or in food. Substances can get into liquids or food by falling into them from the air, or by food coming into contact with chemicals on surfaces or hands. Finally, touching the chemical or substance can occur when dust, mists, or vapors contact bare skin or when unprotected hands touch contaminated

surfaces. Animal and plant life can take up chemicals and substances from the environment in much the same way. Figures 9 and 10 some typical exposure pathways for chemicals used in business operations. When scoring aspects, determine how contact might occur and then decide how severe and how frequent that contact actually is for a given time period. (Choose one month or one year and apply it to every aspect in your scoring exercise.)

The following worksheet will help you think about the exposure for each of the chemicals you consider. This chart can be filled in for each chemical or material and represents your best judgment about exposure. The total score can then be placed in Worksheet 6-2.

Worksheet 6-1 Exposure Scoring Summary

Pathway	Occupational	Nearby population	Environment (e.g., aquatic organisms)
inhaling			
skin contact			
ingesting			
TOTAL			

Note: Refer to consolidated scoring, Figure 8, which shows how to combine your judgement about frequency and severity into one score for exposure.

In scoring, consider both severity and frequency and put the score under “Workers,” “Community,” and “Ecology.” Use the Consolidated Scoring for Exposure Table (Figure 8) to combine your judgements about frequency and severity of exposure. For example, small amounts of a chemical might be released constantly during a process. Thus, frequency would be high (H) while severity might be moderate (M). The consolidated score

which would be entered in Worksheet 6-1 would be M-H. In another case, it is possible that a large amount of a substance might be released occasionally. The frequency would be low (L) but the severity would be high (H). Thus, the consolidated score which would be entered in Worksheet 6-1 would be M-L.

Figure 8: Consolidated Scoring for Exposure

frequency / severity	high	mod-high	moderate	mod-low	low
high	H	H	M-H	M	M-L
mod-high	H	M-H	M-H	M	M-L
moderate	M-H	M-H	M	M	M-L
mod-low	M	M	M	M-L	L
low	M-L	M-L	M-L	L	L

Natural Resource Use

This criterion should be used to identify use of water, energy, and other environmental resources such as forests or land. The score given a particular aspect under this criterion is highly subject to the specific circumstances and values of your company. For example, a high rate of water use would be of higher concern in a desert region than in a region where water is more plentiful. This column allows you to consider what resource issues might be associated with a particular aspect. The score you give is based on your judgment related to your own specific circumstances.

Scoring Examples

The following example shows you how to score the aspects identified in Module 5 using the criteria in Worksheets 6-2a and 6-2b. Examples of both small and large projects are included. It is important to think through even solutions that seem obvious, because sometimes there are better solutions.

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Remember: The scores have no intrinsic meaning. They are merely a shorthand for expressing your judgment about priorities.

Example 1: Toner Cartridges

Consider the use of toner in copying. Unused toner is considered as an input, while used toner is considered as an output. The same product generates different concerns at different stages of its use. Let's look at the criteria for each.

Worksheet 6-2a: Criteria to Determine Significant Aspects*

Criteria / Aspect	Regulatory Concerns	Pollution	Risk: Effects of Chemicals and Materials – Humans	Risk: Effects of Chemicals and Materials – Environment	Risk: Workers (Exposure)	Risk: Community (Exposure)	Risk: Environment (Exposure)	Risk: Noise	Risk: Safety	Natural Resource Use	Total Score
Copying									N/A		
Paper											
Toner (Input)	M	L	M-H	M-H	L	L	L	L		L	M-L
Documents											
Waste Paper											
Used toner (Out)	M-H	H	M-H	M-H	L	L	H	L		M-H	M-H
Odors											

* Include each input and output of a process step.

Scoring Notes:

Regulatory concerns may be present due to the chemicals used inside the cartridge or due to solid or hazardous waste regulations.
Input toner = M Output toner = M-H

Pollution would be a concern unless you recycle the cartridges.
Input toner = L Output toner = H

Effects of Chemicals and Materials inside the toner cartridge are probably of concern. You would have identified these in Module 5. However, since the cartridges are not opened either during input or output use, there would be no exposure. Frequency of impact, therefore, would be low.
Input toner = M-H Output toner = M-H

Workers: Worker health and safety would be of low or no concern if the toner is used only in the cartridges.
Input toner = L Output toner = L

Community: The community's health and safety would be of low or no concern if the toner is used only in the cartridges.
Input toner = L Output toner = L

Environment might be high if you do not currently recycle your cartridges. Chemicals can spill out of the cartridges if they are placed in a landfill.
Input toner = L Output toner = H

Safety and Noise would show no impact. L

Natural Resource Use would be low for air and water, but might be a concern for land if you do not recycle the used cartridge Input toner = L, Output toner = M-H.

How to Obtain Total Score: this can be done in two ways.

1) Look across the columns and assign a total that in your judgement best reflects the individual scores in each column.
2) Assign a number from 1-5 to each score such that H = 5 and L = 1. Sum these across the columns and then divide by the number of columns used to get an average score for that row. For toner input the total would be 13 (not counting Safety). Divide by 8 (the number of columns used). The average score would be 1.63 which corresponds with M-L. Place M-L in the Total column.

Meaning of Score: The total score for toner used as an input is M-L and for used toner as an output is M-H. These scores tell you that toner cartridges as waste outputs of your copying generate more concern than they do as new inputs. This makes intuitive sense, and your main concern would be to reduce any potential impact of the used toner cartridges. This could be accomplished in three ways:

ensure that the cartridges are not opened either before or after use, to avoid exposure to the chemicals;

ensure that the cartridges are recycled according to the distributor's instructions, so that there is neither concern for ecological exposure to the chemicals in landfills, nor a contribution to the solid waste going into landfills; and

reduce the number of waste toner cartridges by cutting down on unnecessary copying.

Example 2: Chemical Use and Waste

A second example will provide more points to consider in developing objectives. Consider the chemical inputs and the chemical waste outputs identified for "Manufacturing Step 1" in Module 5.

Worksheet 6-2b: Criteria to Determine Significant Aspects*

Criteria / Aspect	Regulatory Concerns	Pollution	Risk: Hazards of Chemicals and Materials: Humans	Risk: Hazards of Chemicals and Materials: Environment	Risk: Workers (Exposure)	Risk: Community (Exposure)	Risk: Environment (Exposure)	Risk: Noise	Risk: Safety	Natural Resource Use	Total Score
Making Product Step 1											
Chemicals #1...	M-H	M-L	M	M	M-H	M-L	M-L	L	M-L	M-H	M
Materials #1...											
Energy											
Water											
Chemical Waste #1...	M-H	M-H	M	M	M-H	H	H	L	M-L	M-H	M-H
Mat. Waste #1...											
Waste Water											
Air Releases #1...											
Product for next step											

* Include each input and output of a process step.

Scoring Notes:

Regulatory Concerns: check the lists of regulations and standards to see if they apply to any of the chemicals you have identified as inputs. For outputs from your manufacturing process, find out whether the regulations for solid and hazardous waste make mention of these chemicals. Consider whether new chemical products are formed and become wastes during the process of step 1. If so, don't forget to check for these chemicals as well as the input chemicals. Assuming that the chemicals have some kind of regulatory concern, we will assign a M-H for both input and output.

Pollution would probably be M-L for the input side of chemicals, but probably a M-H for the output side.

Chemical Hazards: review your table of Environmental Concerns from Module 5. In this case, let's assume the chemical showed moderate effects M. For Workers, consider whether opportunity exists for exposure to these chemicals. Consider whether the exposure is by air, skin contact, or some other route. Assign the score from your Exposure Worksheet, let's assume a M-H for this exercise. Consider the surrounding Community and also the Environment. Is there any way that the chemicals used during input escape into the air, water, or land? How about the waste chemicals? Again, take your score from your Exposure Worksheet. Let's assume for this discussion that there are some concerns and assign this category a M-L for input and an H for output.

Safety and **Noise** might be zero, but safety might include reference to a flammable chemical. Hence the score of L for Noise and M-L for Safety.

Natural Resource Use would be important for both input and output of step 1. As for water, consider the quantity of water the step 1 process uses as an input or to take care of waste. Finally, does step 1 involve releasing chemicals to soil? How much land or soil does it use during the process or for disposal of waste? We'll assign a M-H for purposes of discussion.

Meaning of Score:

The total for chemicals used as input for step 1 is M and for the chemical wastes from step 1 is M-H. If you compare all the scores, it would seem that the chemical wastes for step 1 in your company, using your criteria, constitute a more significant concern than the other activities.

Step 3: Determining Which Aspects Are Significant

By reviewing the totals column in your table, you can determine which concerns have the most significance for your company. One approach might be to decide on an arbitrary cut-off point and call all those aspects above that cut-off "significant". This cut-off might change from year to year and different aspects might fall above or below it depending on changing circumstances or values. Furthermore, if the score shows an aspect falling below the significant line, but your instinct tells you that it should be "significant," by all means change the score. The scores, after all, reflect your judgment.

Note: If you are pursuing ISO 14000 **certification**, you will have to address each significant aspect. You may want to consider reducing the number of significant aspects to one or two in the beginning and add more as your company grows in experience with the DfE/EMS process.

Step 4: Consider "Practical" Criteria Also

The next step in developing your EMS is to decide which of these significant aspects it will be practical to work on. "Practical" includes both economic and technical feasibility. It also includes a time frame. While it is important to select high priority projects from an environmental perspective, there is value in undertaking some short term, "easier to implement" projects. The easier projects provide a useful learning experience, boost morale as people see results, and focus

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You do not have to work on all significant environmental aspects. Therefore, it is important to consider the "doability" of each project and to determine what improvements might be achieved by each project before deciding which ones to undertake.

attention on environmental goals.

In the examples above, deciding to reduce the volume of copying and to recycle toner cartridges used in your office copier is a relatively short-term, low-cost environmental program to set in place. Determining how to deal with chemical waste products could be a longer process. It is difficult to pre-judge projects, for the obvious solution may not be the best and a project that appears difficult and long-term may turn out to have a simple solution. Nevertheless, the many alternative approaches to dealing with waste products that could be considered can range from chemical substitutions to changing the nature of the wastes, changing work practices to reduce the value of the waste, and changing disposal methods. The final environmental program might include changes in each of these phases. Deciding to address the problems identified with chemical wastes could be longer-term and more costly. It also might yield greater cost savings than the quicker, cheaper toner cartridge example.

Furthermore, the practical criteria need not be scored but could be considered by simply describing the practical considerations for each potential project.

Worksheet 6-3: Criteria to Select Environmental Projects				
Criteria **Aspect**	**Time Frame**	**Cost**	**Technical Feasibility**	**Total Feasibility**
Toner (In)	N/A	N/A	N/A	N/A
Used Toner (Out)	Short (1 month)	Negligible; time to write procedure	Easy	Excellent
Chemicals (In)	longer evaluation	Employee time	Needs help from suppliers, etc.	More difficult
Chemical Waste (Out)	longer evaluation	Employee time, process change	Needs help from suppliers, etc.	More difficult

Step 5: Consider the Potential Benefits

The last set of criteria has to do with the expected benefits to be derived from improving the environmental impact of the significant aspects. The purpose of this exercise is simply to identify what effects you would have to achieve, not to try to quantify returns. Like any undertaking in a business operation, you should be able to describe what you expect to get before you undertake the project! First, develop a list of benefits criteria. These might include such things as:

Improved human health
Improved ecology
Cost savings
Improved community relations
Improved employee morale

Again, these particular criteria might not fit your company. Make a list of criteria identifying benefits that could be derived from undertaking a particular environmental project. These expected improvements or benefits need not be scored; simply describe the potential for each criterion to be achieved. Scoring

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Considering the benefits does not mean undertaking an analysis of potential outcomes. It means identifying the kinds of improvements that might be achieved by implementing a particular project and then deciding what value (priority) that improvement has for your company.

is one way to represent your judgment. Worksheet 6-4 illustrates the two examples.

Worksheet 6-4: Criteria to Determine Benefits

Criteria / Aspect	Human Health[1]	Environment	Cost Savings	Community Relations	Morale	Expected Benefits
Toner (In)	Little effect	Little	Low	N/A	N/A	N/A
Used Toner (Out)	Some effect through waste	Some effect in waste	Some	Good; shows effort	Good learning tool	Some
Chemicals (In)	Improve worker health	Some improve, air	Some through efficiency	Good	Good; workers happy	Good
Chemical Waste (Out)	Improve community; reduce presence of hazardous materials	Improve effect on landfill, groundwater, habitat	Some through efficiency and reduced waste fees	Excellent PR	Good; workers would appreciate less noxious waste	Excellent

[1] Workers, Community, Global

Summary of Scoring

If you are using scoring in your decision process, Figure 9 provides an example of a summary worksheet. The example illustrates that while chemical waste may present one of the most involved projects from the point of view of feasibility, it may also provide the greatest benefits. The final decision rests with your company and should reflect both your values and your needs. You may want to undertake both a short-term and a long-term project.

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It is important to recognize that the tables are merely a tool to help you summarize your judgment and organize your thoughts. The scores placed in the tables do not have any intrinsic value but are used for purposes of comparing the results to each other.

Worksheet 6-5: Overall Criteria Scoring Summary				
Process Step Criteria Aspect I	**Aspect Total**	**Feasibility Total**	**Benefits Total**	**Significant Y/N**
Toner (In)	M-L	N/A	N/A	
Used Toner	M-H	H	M	N
Chemicals	M	M-L	M-H	
Chemical Waste	H	M-L	H	Y

Step 6: Making Improvements: Creating Standards and Setting Objectives

The point of the priority setting exercises, of course, is to improve your company's impact on the environment. Module 7 describes the process of setting and carrying out environmental performance standards for the significant environmental aspects. Module 8 describes the process of setting environmental objectives, evaluating alternatives, and selecting targets for those significant aspects you choose to change.

You now have a short list of significant environmental aspects. You are ready to improve your company's performance by improving the environmental impact of one or more of these significant environmental aspects. Tackle what you can handle, tackle what is environmentally important, and tackle whatever is urgent. Your company can start on any remaining significant environmental aspects when you have completed the first ones.

Note on Grouping Environmental Aspects:

In reviewing your company's list of aspects you may discover that there are aspects that occur in more than one process step. Energy use is a good example. There might be circumstances where it would be effective to combine all the process steps having energy aspects and develop a facility-wide strategy and program for achieving improvement. It is important to understand, however, that the energy aspect should be scored in each process step to determine its relative importance in that step. For example, energy use in office work might be a different priority than energy use in a manufacturing step. In addition, standards and procedures developed to reduce energy use would be different for each process step. Consequently, while a facility-wide effort might achieve certain efficiencies, the actual environmental improvement will be attained through objectives set for each process step.